

Turbo-Brayton Power Converter

For space flight and extreme environments

Future NASA space missions will require advanced thermal-to-electric power converters that are reliable, efficient, and lightweight. Creare, LLC, is developing a turbo-Brayton power converter that offers high efficiency and specific power. The converter employs gas bearings to provide maintenance-free, long-life operation. Discrete components can be packaged to fit optimally with other subsystems, and the converter's continuous gas flow can communicate directly with remote heat sources and heat rejection surfaces without the need for ancillary heat-transfer components and intermediate flow loops.

Creare has completed detailed analyses, trade studies, fabrication trials, and preliminary designs for the components and converter assembly. The company is fabricating and testing a breadboard converter.

Applications

NASA

- ▶ Space exploration probes
- ▶ Unmanned surface rovers
- ▶ Nuclear electric propulsion
- ▶ Space station power systems

Commercial

- ▶ Unmanned aerial vehicles
- ▶ Unmanned undersea vehicles
- ▶ Mobile electric generators
- ▶ Environments with significant particulate contamination (e.g., sand, dirt, dust)
- ▶ Environments exposed to corrosive substances (e.g., seawater)



Phase II Objectives

- ▶ Develop detailed component designs
- ▶ Design breadboard converter assembly
- ▶ Fabricate turbomachine
- ▶ Fabricate heat exchangers
- ▶ Assemble converter
- ▶ Measure converter performance characteristics
- ▶ Demonstrate benefits for space flight applications
- ▶ Enhance readiness level for future programs

Benefits

- ▶ Reliable
- ▶ Efficient
- ▶ Lightweight
- ▶ Maintenance-free
- ▶ Long-life operation
- ▶ Scalable

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Proposal Number: 12-2 H8.03-9492